



Does Learning Style Make a Difference on Student's Academic Performance? Learning Style Preferences of Medical Students from University Tunku Abdul Rahman

Kye Mon Min Swe^{1*} and Kang Wayn Hann¹

¹Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, Malaysia.

Authors' contributions

This work was carried out in collaboration between both authors. Author KMMS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KWH managed the literature searches. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2020/v18i230183

Editor(s):

(1) Professor, Darko Nozic, University of Belgrade, Serbia.

Reviewers:

(1) Sneha Kumari, ESIC Medical College and Hospital, India.

(2) Shigeki Matsubara, Jichi Medical University, Japan.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/56097>

Original Research Article

Received 12 February 2020

Accepted 19 April 2020

Published 22 April 2020

ABSTRACT

Background: Learning preference is the effective and efficient modality or manner in which a learner has a natural preference to perceive process, store and recall new information. Learning style is the composite of cognitive, affective and physiological characteristics that indicate how a learner perceives, interacts and responds to the learning environment.

Objectives: The objectives of the study were to assess the teaching and learning style preferences of medical students at UTAR by using VARK (Visual/Auditory/Reading/Kinesthetics) inventory questionnaires and to identify the different learning style preferences between gender and the academic year of medical education (pre-clinical year versus clinical year).

Methodology: This was a university-based cross-sectional study involving 235 students from year 1 to year 5 in University Tunku Abdul Rahman, Malaysia from December 2017 to December 2018. Students, selected via universal sampling, were given the VARK inventory questionnaires determine their preferences of learning style. Data were further analysed using SPSS (version 22.0, IBM).

*Corresponding author: E-mail: kyemon@utar.edu.my, khmoneminswe@gmail.com;

Results: Of the 203 students (86.4%) who responded to the questionnaire, 62.1% of them were females while 80.3% of them were between 21-25 years of age. 86 students (42.4%) were from the preclinical phase while 117 (57.6%) were from the clinical phase. 70.4% of the students preferred studying alone to studying with a partner or group of friends (29.6%). Among them, 157 medical students (77.3%) preferred multimodal learning style, with the most preferred mode trimodal which means combination of three sensory preference for example VAR or ARK, 35.67%, followed by quadrimodal which means combination of all four sensory preference for example VARK, 33.76% and bimodal which means combination of two sensory preference for example VA or AR, 30.57%. The remaining 46 students (22.7%) were unimodal learners (visual or auditory or reading or kinaesthetic) and 37% of them preferred kinesthetics which was learners prefer hands-on, practical experience. There was no significant difference in VARK modalities in terms of gender ($p=0.39$) and academic year ($p=0.16$).

Conclusion: In conclusion, majority of UTAR medical students preferred multiple modalities with trimodal being the most prevalent mode. Among unimodal learners, kinesthetics were the most preferred mode. There was no significant difference in VARK modalities in terms of gender and academic year.

Keywords: Learning style; VARK; medical students; Malaysia.

1. INTRODUCTION

The learning style can be defined as “an individual’s preferred method of gathering, processing, interpreting, organizing and analysing information [1]. It is also “the composite of cognitive, affective and physiological characteristics that indicate how a learner perceives, interacts and responds to the learning environment” [2]. Is it important for a curriculum planner to know the learning style of their prospective students? Studies have shown that knowing the students preferred mode of learning allows the medical educators to plan a medical education curriculum that suits the students’ need for effective learning, which ultimately translates to better academic performances [3-5].

Medical education is often very challenging as the curriculum focuses more on andragogy, often synonymous with the adult learning approach, which emphasizes on learner-centred, in comparison to the traditional teacher-centred curriculum. It is essential for educators to recognize and understand different learning styles of their students to formulate and tailor different teaching strategies to the needs of their students [6,7]. As medical education requires the coverage of extensive syllabus within a limited time, effective teaching needs to be employed as it correlates strongly with academic performances. Previous studies have shown that the knowledge and understanding of one’s own learning style, strongly enhances a student’s success in summative examinations [8,9].

According to literature, there has been different learning styles and theories proposed by various authors, such as David Kolb, Peter Honey and Alan Mumford, and Anthony Gregorc [9-11]. Among them, the VARK learning inventory developed by Neil Fleming’s is one of the most common and widely used learning style. The visual, aural, read/write and kinaesthetic (VARK) learning inventory developed by Neil Fleming provides learners with a profile of their preferred modes of taking in information. The visual (V) learners mainly learn from reading information, the aural (A) learners prefer to hear information, the read/write (R) learners prefer information in the form of written words, whilst the kinaesthetic (K) learners prefer hands-on, practical experience. Learners may prefer only one mode strongly (unimodal) or may have dual (bimodal), triple (tri-modal) or even all four preferences (quadrimodal). Multimodal learners require input from different modes to fully understand a concept whereas unimodal learners usually require input in their corresponding mode only [12].

University Tunku Abdul Rahman is one of the well-known private university in Malaysia and medical program was started in year 2009 where the preclinical years are based at the Sungai Long Campus, and the clinical years at the Clinical Teaching Centre in Ampang, located near to Hospital Ampang.

The study was conducted to assess the learning style preferences of medical students of Universiti Tunku Abdul Rahman (UTAR) and to identify the differences in learning style

preferences between gender and the stage of medical education (pre-clinical year versus clinical year). In general, the findings of this study will provide insight into the ways how our medical students learn in relation to their learning environment they have experienced and the study results will help to shed light on developing future medical students curriculum.

2. MATERIALS AND METHODS

2.1 Setting and Participants

A cross-sectional study was conducted at University Tunku Abdul Rahman from December 2017 to December 2018 and all the 235 MBBS students from year 1 to year 5, were invited to participate in the study.

2.2 Instruments

The questionnaires were used as tool to determine the students' most preferred teaching and learning methods and their learning style preferences. Structured questionnaires consisting two section, the first session was about general demographic information (age, gender) and second session contained the VARK inventory (Version 7.1) which is used to sample sensory preferences of learning [13]. This part consists of 16 multiple-choice questions with four options as answers. Each answer represents a sensory modality preference and students can choose multiple options or leave blank any question as long as their preferred response(s) could be adequately described within the situation. Selection of answers representing the same sensory modality preference was added to obtain the score for each VARK component.

2.3 Procedures

In January 2018, printed copies of VARK questionnaire were distributed to students in different sessions without interrupting on-going lectures. The data was collected after their lecture classes for preclinical students at UTAR Sungai Long campus and after small group teaching classes for clinical students at Clinical teaching centre which was 14 km away from main campus. Explanation was provided and written informed consent was obtained before administration of questionnaire. Completed questionnaires were collected from respondents subsequently over the weeks. The ethical approval was obtained from UTAR ethical committee.

2.4 Statistical Analyses

The data were analysed according to the guidelines given in the VARK website. Descriptive statistics were used to analyse each of the VARK component. The Chi-square test was used to determine the differences between VARK modalities according to gender and academic years using SPSS (version 22.0, IBM).

3. RESULTS

There were a total of 235 medical students enrolled in the academic year of 2017/2018 and 203 students participated in the study, with the response rate of 86.3%. Most of the participants were 163 were of the age group 21-25 (80.3%) and the majority were females (126, 62.1%) were female students. 42.4% of the respondents were preclinical students and 57.6% were clinical years students. The sociodemographic character of the respondents were shown in Table 1.

Regarding student's study companion preferences, majority of students 143(70.4%) preferred to study alone compared to study with partner or group of friends 60 (29.7%). In terms of teaching methods, multiple responses were reported that they learned more during bed side teaching 114 (56.2%), followed by small group teaching 110 (54.2%). Around half 126 (62.1%) of the students thought that learning style change depends on the age.

3.1 VARK Modalities and Scores

Majority 157 (77.3%) of the students preferred multimodal learning style while 46 (22.7%) students preferred unimodal. Among the multimodal learners, the most preferred mode was trimodal 56 (35.7%), followed by quadrimodal 53 (33.8%) and bimodal 48 (30.6%) (Fig. 2). Of the unimodal learners, the most preferred modality was kinesthetics (37.0%). Of all the total respondents, 3.9%, 4.9%, 5.5 %, and 8.5% of students preferred the visual, aural, reading/writing and kinaesthetic modes, respectively. This simply indicates that only 26.7% of students preferred to learn by a single sensory modality (visual, auditory, reading/writing, or kinaesthetic). Among the 77.3% students who preferred to learn by multiple sensory modalities, 30.6%, 35.7% and 33.7% were bimodal, trimodal and quadrimodal, respectively (Fig. 1).

Table 1. Sociodemographic character of the respondents (n=203)

Sociodemographic characters of participants		Frequency	Percent
Age Group	16-20 years	37	18.2
	21-25 years	163	80.3
Gender	Male	77	37.9
	Female	126	62.1
Academic years	Preclinical (year 1-2)	86	42.4
	Clinical (year 3-5)	117	57.6
Total		203	100

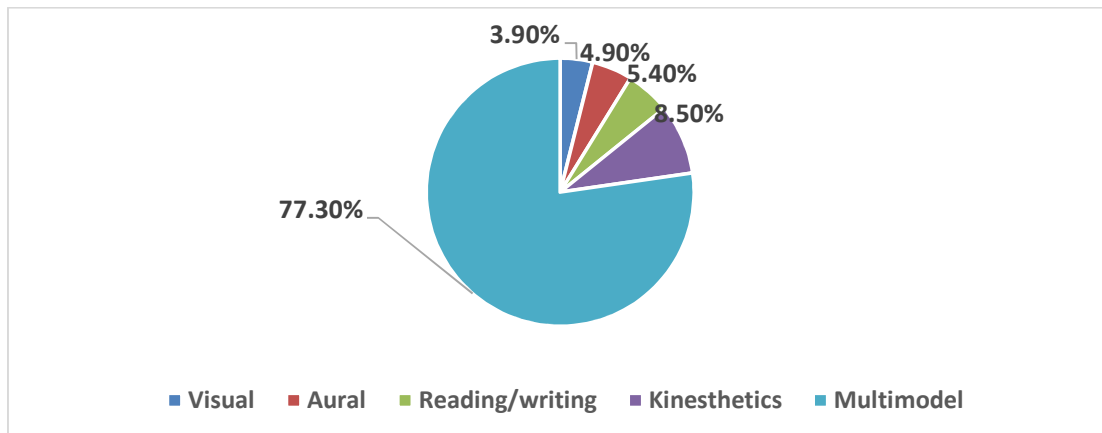


Fig. 1. Pie Chart showing the percentage of students with unimodal and multimodal learning preferences

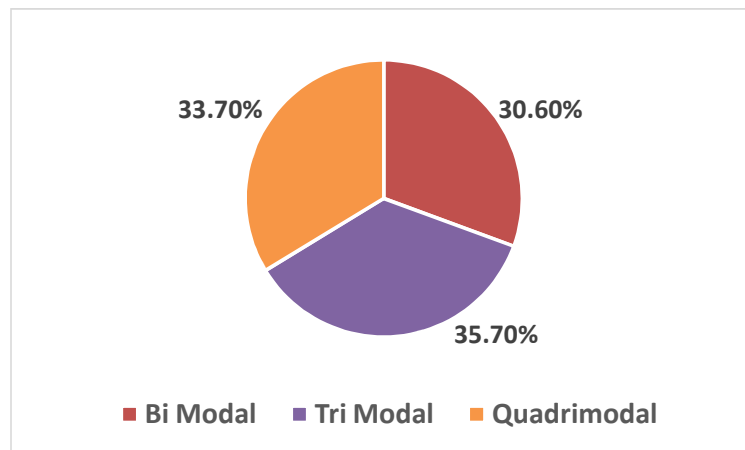


Fig. 2. The percentages of students who preferred bimodal, trimodal or quadrimodal learning style preferences (n=203)

The dominant learning preferences of bimodal and trimodal learner students were mixed mode of visual, auditory, reading and kinesthetic (Fig. 3) and 33.8% of students who preferred quadrimodal use all components for learning, i.e. visual, auditory, reading/writing, and kinesthetic both male and female students prefer multimodal

learning styles to unimodal but it was not statistically significant ($p=0.39$, $chi\ square\ (x^2) = 0.71$). (Table 2) There was also no statistically significant difference between the preclinical and clinical students in their preference of multimodal learning style ($p=0.16$, $chi\ square\ (x^2) = 2.47$) (Table 3).

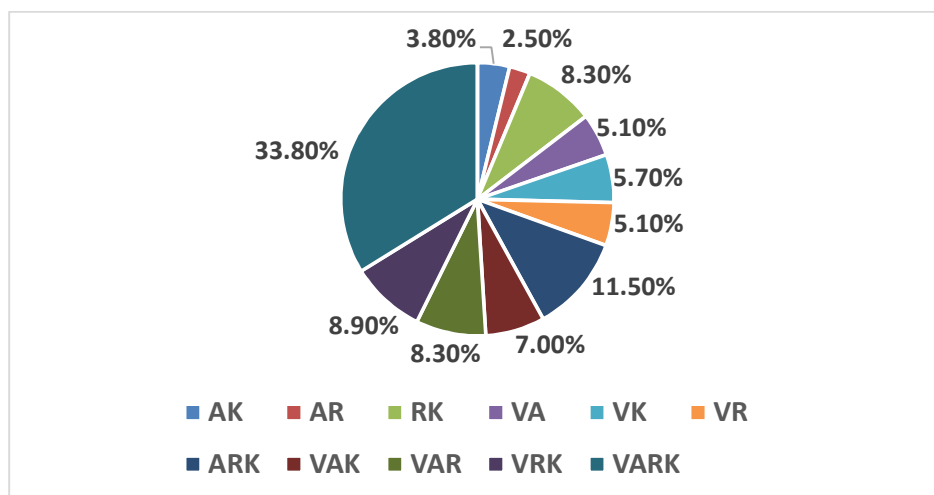


Fig. 3. The percentages of students with a preferred combination of learning styles

Table 2. Relationship between gender and Unimodal and multimodal learning style

		VARK Modalities		Total	
		Unimodal	Multimodal		
Gender	Male	22	55	77	Chi square 0.71 P - 0.39
	Female	24	103	126	
Total		46	157	203	

Table 3. Relationship between gender and unimodal and multimodal learning style

		VARK modalities		Total	
		Unimodal	Multimodal		
Gender	Preclinical	17	69	86	Chi square 2.47 P - 0.16
	Clinical	29	88	117	
Total		46	157	203	

4. DISCUSSION

This study was conducted at University Tunku Abdul Rahman, Malaysia to understand the learning style preferences of UTAR medical students and the findings of this study provided insight into the ways how medical students learned in relation to their experiences on learning environment they have encountered. In this study 62.1% of UTAR medical students preferred studying alone to studying in groups or with their friends, and this result was similar to medical students from AIMST University, Malaysia (71%) [14].

The most preferred learning style preferences among UTAR medical students were multimodal (77.3%) and this was in tandem with other studies conducted in Malaysia and in other regions [13,15-18].

Multimodal learners included bimodal, trimodal or quadrimodal learning preferences. Previous studies also suggested that students with multimodal learning modes had better academic performances compared with unimodal learners but the evidence is still scarce [19,20]. There was no relationship shown between learning style preference and academic achievement [21].

Among multiple mode of preference, the trimodal (35.7%) is the most preferred style of learning and it was similar with the studies where trimodal learning style was preferred among the multimodal learners [22-24]. Some studies found preference with bimodal and quadrimodal [7,16, 25,26].

However, there were some regional and local studies which reported that unimodal learners

were predominantly more common in their medical schools [7,14,20,21]. Among UTAR's unimodal learners 37% of them preferred kinaesthetic mode, corresponding to the other studies by other authors [16,22,25,27,28]. The wide prevalence of kinesthetic learners supported the change from didactic learning to practicality and self-learning which were results of changing trend of medical education [26]. Kinesthetics learners prefer active learning strategies such as small group discussions and problem based learning [27].

There was no significant gender difference seen in learning style preferences, as shown by previous studies [17,18,22,24,28,29]. Despite that, there were studies which showed that female students had more diverse multimodal learning preferences compared to their male counterparts who were more likely to preferred kinesthetics mode [7,15,24,28,30]. There was also no significant difference in VARK modalities in terms of academic year. This results was similar to the study by Swe & et al., showing no significance difference between preclinical years and clinical years students [15]. This was probably due to the early exposure of preclinical students to clinical teachings experiences by the integrated curriculum as well as small group teaching which made kinesthetics-style learning more preferable.

4.1 Study Limitation

The sample consists of medical students from UTAR and the study assessed only an aspect of learning preferences by using VARK inventory.

4.2 Study Implication

Based on the results from this study, the UTAR medical school should design their learning environment to cater more for the majority of students who prefer to study alone. Furthermore, as the majority of the students preferred multimodal learning style, educators should be encouraged to design flexible teaching strategies, especially more experiential and hands-on learning style to promote kinaesthetic learning. An example of a comprehensive teaching strategy would be to prepare flow charts, graphs and diagrams for visual learners, small group collaborate learning or problem-based learning for auditory learners, role playing sessions for kinaesthetic and tactile learners and finally reflective writing practice for those who prefer reading/writing styles. To achieve effective

learning, the various teaching strategies must be applied in concordance to the learning objectives. These improvisations in medical education will generate motivation to enhance student learning in an effective learning environment that further leads to better academic achievement in their study.

5. CONCLUSIONS

In conclusion, majority of UTAR medical students preferred to learn via multiple modalities with trimodal being the most prevalent mode. Among unimodal learners, kinesthetics was the most prevalent mode and there was no significant difference in VARK modalities in terms of gender and academic year.

CONSENT AND ETHICAL APPROVAL

Explanation was provided and written informed consent was obtained before administration of questionnaire. Completed questionnaires were collected from respondents subsequently over the weeks. The ethical approval was obtained from UTAR ethical committee.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Professor Dr. Cheong Soon Keng, the Dean for Faculty of Medicine and Health Sciences, and Professor Dr. Shelly Soo, former professor of Medicine, UTAR for their kind support for this study. Special thanks to all the medical students of UTAR from academic year 2017/2018 for their participation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Fleming ND, Mills C. Not another inventory, rather a catalyst for reflection. *To Improv Acad.* 1992;11:137-155. DOI: 10.1002/j.2334-4822.1992.tb00213.x
2. Keefe JW. Learning style: An overview. NASSP's Student learning styles: Diagnosing and proscribing programs. Reston, VA: National Association of Secondary School Principles; 1979.
3. Rourke BP, Ahmad SA, Collins DW, Hayman-Abello BA, Hayman-Abello SE, Warriner EM. Child clinical/pediatric neuropsychology: Some recent advances. *Annu Rev Psychol.* 2002;53:309-339.

- DOI:10.1146/annurev.psych.53.100901.135204.
4. Urval RP, Kamath A, Ullal S, Shenoy AK, Shenoy N, Udupa LA. Assessment of learning styles of undergraduate medical students using the VARK questionnaire and the influence of sex and academic performance. *Adv Physiol Educ.* 2014; 38:216-220.
DOI: 10.1152/advan.00024
 5. Ismail S, Rahman NIA, Mohamad N, et al.: Preference of teaching and learning methods in a new medical school of Malaysia. *J Appl Pharm Sci.* 2014;4:48-55.
DOI: 10.7324/JAPS.2014.40208
 6. Collins J. Education techniques for lifelong learning: *Radio Graphics.* 2004;24:1483-1489.
DOI: 10.1148/rg.245045020
 7. Kharb P, Samanta PP, Jindal M, Singh V. The learning styles and the preferred teaching-learning strategies of first year medical students. *J Clin Diagnostic Res.* 2013;7:1089-1092.
DOI: 10.7860/JCDR/2013/5809.3090
 8. Williamson MF, Watson RL. Learning styles research: Understanding how teaching should be impacted by the way learners learn part III: Understanding how learners' personality styles impact learning. *Christ Educ J Res EducMinist.* 2007;4:62-77.
DOI: 10.1177/073989130700400105
 9. Sternberg RJ, Grigorenko EL, Zhang LF. Styles of learning and thinking matter in instruction and assessment. *Perspect Psychol Sci.* 2008;3:486-506.
DOI: 10.1111/j.1745-6924.2008.00095.x
 10. Kolb A, Kolb D. Learning styles and learning spaces: Enhancing experiential learning in higher education. *AcadManag Learn Educ.* 2005;4:193-212.
 11. Honey P, Mumford A. *The manual of Learning Styles.* Maidenhead; 1982.
 12. Fleming ND. I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom. *Res Dev High Educ Proc Annu Conf High Educ Res Dev Soc Australas.* 1995;18:308-313.
 13. Kumar LR, Voralu K, Pani SP, Sethuraman KR. Predominant learning styles adopted by AIMST University students in Malaysia. *South East Asian J Med Educ.* 2009;37-46.
 14. Sabitha Panambur, Vinod Nambiar, Thomas Heming. Learning style preferences among pre-clinical medical students in Oman. *Omen Med J.* 2014;29(6):461-463.
 15. Swe Kye Mon Min, Wen C, Kumar S, Bhardwaj A. Learning style preferences of medical students in Perdana University-Royal College of Surgeons in Ireland School of Medicine, Malaysia. *Br J Med Med Res.* 2016;18:1-8.
DOI: 10.9734/BJMMR/2016/29089
 16. Neha S. Kulkarni. Learning styles preferences of first year medical students of J N Medical College Belgaum: A single Institute Experience In Karnataka, India. *Natl J Integr Res Med.* 2015;6:80-83.
 17. Daud S, Kashif R, Chaudhry AM. Learning styles of medical students. *South East Asian J Med Educ.* 2014;8:40-46.
DOI: 10.4038/seajme.v8i1.123
 18. Chaudhary M, Aftab A, Ayub S, et al. Association of academic performance with learning style preference of medical students: Multi-center study from Pakistan. *J Contemp Med Educ.* 2015; 3:110.
DOI: 10.5455/jcme.20151011041452
 19. Samarakoon L, Fernando T, Rodrigo C, Rajapakse S. Learning styles and approaches to learning among medical undergraduates and postgraduates. *BMC Med Educ.* 2013;13:42.
DOI: 10.1186/1472-6920-13-42
 20. Liew SC, Sidhu J, Barua A. The relationship between learning preferences (Styles and approaches) and learning outcomes among pre-clinical undergraduate medical students Approaches to teaching and learning. *BMC Med Educ.* 2015;1-7.
DOI: 10.1186/S12909-015-0327-0
 21. Almigbal TH. Relationship between the learning style preferences of medical students and academic achievement. *Saudi Med J.* 2015;36:349-355.
DOI: 10.15537/smj.2015.3.10320
 22. Felder RM. Learning style. *On-course Newsletter;* 2010.
 23. Nuzhat A, Salem RO, Hamdan N. Al, Ashour N. Gender differences in learning styles and academic performance of medical students in Saudi Arabia. *Med Teach.* 2013;35.
DOI: 10.3109/0142159X.2013.765545
 24. Nuzhat A, Salem RO, Quadri MSA, Al-Hamdan N: Learning style preferences of medical students: A single-institute experience from Saudi Arabia. *Int J Med Educ.* 2011;2:70-73.
DOI: 10.5116/ijme.4e36.d31c

25. Sinha N, Bhardwaj A, Singh S, Abas A. Learning preferences of clinical students: A study in a Malaysian medical college. *Int J Med Public Heal.* 2013; 3:60. DOI: 10.4103/2230-8598.109325
26. Farooque I, Mustafa S, Mohammad F. Learning style preferences of first year undergraduate medical students. *J Evid Based Med Healthc.* 2014;1:1445-1452. DOI: 10.18410/jebmh/2014/215
27. Edussuriya D, Ubhayasiri S, Abeywardhana N, Wickramasinghe M. Learning preferences of medical students - a study conducted at the University of Peradeniya, Sri Lanka. *Sri Lanka J Med.* 2016;25:3. DOI: 10.4038/sljm.v25i1.13
28. Prithishkumar I, Michael S. Understanding your student: Using the VARK model. *J Postgrad Med.* 2014;60:183. DOI: 10.4103/0022-3859.132337
29. Alkhasawneh IM, Mrayyan MT, Docherty C, Alashram S, Yousef HY. Problem-based Learning (PBL): Assessing students' learning preferences using vark. *Nurse Educ Today.* 2008;28:572-579. DOI:10.1016/j.nedt.2007.09.012
30. Jamani NA, Abdaziz KH, Syazana H, et al. Learning style preferences among pre-clinical medical students in a Public University in Pahang. *Int Med J Malaysia.* 2018;17:2-2.

© 2020 Swe and Hann; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/56097>